

WHAT IS CLAIMED IS:

1 1. A method for discovering a topology of a switch from an initiator device,
2 wherein the switch includes a plurality of switch ports, wherein a plurality of
3 Input/Output (I/O) devices are connected to the switch ports, wherein each I/O device
4 and the initiator device connect to the switch through one of the switch ports, wherein the
5 initiator and I/O devices communicate on a first network configured by the switch,
6 wherein the initiator device communicates with the switch over a second network, and
7 wherein the initiator device performs:
8 submitting a first query over the first network to the switch requesting a unique
9 address of a plurality of I/O devices that are accessible to the initiator device over the
10 first network;
11 receiving, in response to the first query to the switch on the first network, the
12 unique address of each I/O device from the switch;
13 submitting a second query over the second network to the switch for information
14 on switch ports on the switch;
15 receiving, in response to the second query to the switch over the second network,
16 the information on the switch ports; and
17 generating information on a topology of the switch ports and the initiator and I/O
18 devices having the unique address.

1 2. The method of claim 1, wherein at least one I/O device is attached to a
2 loop, wherein the loop is attached to the switch port through which the device connects to
3 the switch.

1 3. The method of claim 2, wherein each loop comprises a Fibre Channel
2 Arbitrated Loop, and wherein each unique address comprises an eight bit Arbitrated
3 Loop Physical Address.

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1 4. The method of claim 2, further comprising:
2 receiving, in response to the first query to the switch over the first network,
3 switch addresses the switch assigns to the I/O devices attached to the switch ports,
4 wherein the topology information is generated to include the received switch addresses
5 for the I/O devices.

1 5. The method of claim 4, wherein the switch addresses comprises an
2 Arbitrated Loop Physical Address.

1 6. The method of claim 1, wherein the first network comprises a Fibre
2 Channel network and wherein the second network comprises an Ethernet network,
3 wherein the switch and less than all of the devices are connected to the second network.

1 7. The method of claim 1, wherein the unique address for each device is a
2 world wide name (WWN) of the device.

1 8. The method of claim 1, wherein the switch and switch ports implement
2 segmented loop technology.

1 9. The method of claim 1, wherein the initiator device further performs:
2 submitting an additional query on the second network to at least one other
3 initiator device connected to one switch port, wherein the at least one other initiator
4 device generates topology information to determine topology information for I/O devices
5 to which the at least one other initiator device is capable of communicating; and
6 updating the topology information with topology information received in response
7 to each additional query on the second network from the at least one other initiator
8 device.

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1 10. The method of claim 9, wherein the topology information received in
2 response to the additional query to the at least one other initiator device is capable of
3 including topology information on I/O devices in different zones implemented by the
4 switch.

1 11. The method of claim 1, wherein the I/O devices include storage systems
2 and initiator devices.

1 12. The method of claim 1, wherein there is one unique address for each I/O
2 device and initiator included in the topology information, wherein each I/O device and
3 initiator is capable of including multiple ports.

1 13. The method of claim 1, wherein there is one unique address for each port
2 in the I/O devices and initiators included in the topology information.

1 14. The method of claim 13, further comprising:
2 receiving, in response to the first query to the switch over the first network, a
3 switch address assigned to each I/O device port, wherein the generated topology
4 information provides the switch address for each initiator device port and I/O device port.

1 15. The method of claim 14, further comprising:
2 after obtaining information on all the switch ports on the switch, submitting at
3 least one additional query to the switch for the switch addresses of all I/O device ports
4 connecting to each switch port;
5 receiving, in response to the at least one additional query, the switch address for
6 each I/O device port connecting to each switch port;
7 determining, from the topology information, each I/O device port whose switch
8 address matches one switch address included in the received response to the at least one
9 additional query; and

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10 updating the topology information to include the switch port with the I/O device
11 port whose switch address matches one switch address identified in the received response
12 to the third query as connecting to the switch port.

1 16. The method of claim 15, wherein the topology information is updated for
2 I/O device ports attached to one switch port in the same zone as the initiator device.

1 17. The method of claim 16, wherein at least one other initiator device
2 generates topology information to determine topology information for I/O devices to
3 which the at least one other initiator device is capable of communicating, further
4 comprising:
5 querying the at least one other initiator device to obtain the topology information
6 generated by the at least one other initiator device; and
7 updating the topology information with topology information received in response
8 to querying the at least one other initiator device, wherein the topology information
9 received from the at least one other initiator device is capable of including I/O devices in
10 other switch zones.

1 18. A system for discovering a network topology, comprising:
2 (a) a switch having a plurality of switch ports;
3 (b) at least one I/O device, wherein each I/O device is connected to one switch
4 port;
5 (c) an initiator device connected to one switch port;
6 (d) a first network configured by the switch, wherein the initiator and I/O devices
7 communicate on the first network through the switch ports;
8 (e) a second network on which the initiator device and switch communicate;
9 (f) a computer readable medium within the initiator device including code
10 executed by the initiator device, wherein the code causes the initiator device to perform:

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11 (i) submitting a first query over the first network to the switch requesting
12 a unique address of a plurality of I/O devices that are accessible to the initiator
13 device over the first network;

14 (ii) receiving, in response to the first query to the switch on the first
15 network, the unique address of each I/O device from the switch;

16 (iii) submitting a second query over the second network to the switch for
17 information on switch ports on the switch;

18 (iv) receiving, in response to the second query over to the switch over the
19 second network, the information on the switch ports; and

20 (v) generating information on a topology of the switch ports and the
21 initiator and I/O devices having the unique address.

1 19. The system of claim 18, further comprising:

2 a loop attached to one switch port, wherein at least one I/O device is attached to
3 the loop, wherein the loop is attached to the switch port through which the device
4 connects to the switch.

1 20. The system of claim 19, wherein each loop comprises a Fibre Channel
2 Arbitrated Loop, and wherein each unique address comprises an eight bit Arbitrated
3 Loop Physical Address.

1 21. The system of claim 19, wherein the code further causes the initiator
2 device to perform:

3 receiving, in response to the first query to the switch over the first network,
4 switch addresses the switch assigns to the I/O devices attached to the switch ports,
5 wherein the topology information is generated to include the received switch addresses
6 for the I/O devices.

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1 22. The system of claim 21, wherein the switch addresses comprises an
2 Arbitrated Loop Physical Address.

1 23. The system of claim 18, wherein the first network comprises a Fibre
2 Channel network and wherein the second network comprises an Ethernet network,
3 wherein the switch and less than all of the devices are connected to the second network.

1 24. The system of claim 18, wherein the unique address for each device is a
2 world wide name (WWN) of the device.

1 25. The system of claim 18, wherein the switch and switch ports implement
2 segmented loop technology.

1 26. The system of claim 18, further comprising:
2 at least one other initiator device connected to one switch port, and
3 wherein the code further causes the initiator device to perform:
4 (i) submitting an additional query on the second network to at least one
5 other initiator device connected to one switch port, wherein the at least one other
6 initiator device generates topology information to determine topology information
7 for I/O devices to which the at least one other initiator device is capable of
8 communicating; and

9 (ii) updating the topology information with topology information received
10 in response to each additional query on the second network from the at least one
11 other initiator device.

1 27. The system of claim 26, wherein the topology information received in
2 response to the additional query to the at least one other initiator device is capable of
3 including topology information on I/O devices in different zones implemented by the
4 switch.

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1 28. The system of claim 18, wherein the I/O devices include storage systems
2 and initiator devices.

1 29. The system of claim 18, wherein there is one unique address for each I/O
2 device and initiator included in the topology information, wherein each I/O device and
3 initiator is capable of including multiple ports.

1 30. The system of claim 18, wherein there is one unique address for each port
2 in the I/O devices and initiators included in the topology information.

1 31. The system of claim 30, wherein the code further causes the initiator
2 device to perform:
3 receiving, in response to the first query to the switch over the first network, a
4 switch address assigned to each I/O device port, wherein the generated topology
5 information provides the switch address for each initiator device port and I/O device port.

1 32. The system of claim 31, wherein the code further causes the initiator
2 device to perform:
3 submitting, after obtaining information on all the switch ports on the switch, at
4 least one additional query to the switch for the switch addresses of all I/O device ports
5 connecting to each switch port;
6 receiving, in response to the at least one additional query, the switch address for
7 each I/O device port connecting to each switch port;
8 determining, from the topology information, each I/O device port whose switch
9 address matches one switch address included in the received response to the at least one
10 additional query; and
11 updating the topology information to include the switch port with the I/O device
12 port whose switch address matches one switch address identified in the received response
13 to the third query as connecting to the switch port.

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1 33. The system of claim 32, wherein the topology information is updated for
2 I/O device ports attached to one switch port in the same zone as the initiator device.

1 34. The system of claim 33, further comprising:
2 at least one other initiator device generating topology information to determine
3 topology information for I/O devices to which the at least one other initiator device is
4 capable of communicating;
5 wherein the code further causes the initiator to perform:
6 (i) querying the at least one other initiator device to obtain the topology
7 information generated by the at least one other initiator device; and
8 (ii) updating the topology information with topology information received
9 in response to querying the at least one other initiator device, wherein the
10 topology information received from the at least one other initiator device is
capable of including I/O devices in other switch zones.

1 35. A system for discovering a network topology, wherein an initiator device
2 and at least one I/O device communicate on a first network, and wherein the initiator
3 further communicates on a second network, comprising:
4 (a) a switch having a plurality of switch ports, wherein each I/O device and
5 initiator device are connected to one switch port, wherein the wherein the switch includes
6 code to perform:
7 (i) configuring the first network, wherein the initiator and I/O devices
8 communicate on the first network through the switch ports;
9 (ii) communicating with the initiator device on the second network;
10 (b) a computer readable medium including code executed by the initiator device
11 including code executed by the initiator device, wherein the code causes the initiator
12 device to perform:

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- 13 (i) submitting a first query over the first network to the switch requesting
14 a unique address of a plurality of I/O devices that are accessible to the initiator
15 device over the first network;
- 16 (ii) receiving, in response to the first query to the switch on the first
17 network, the unique address of each I/O device from the switch;
- 18 (iii) submitting a second query over the second network to the switch for
19 information on switch ports on the switch;
- 20 (iv) receiving, in response to the second query over to the switch over the
21 second network, the information on the switch ports; and
- 22 (v) generating information on a topology of the switch ports and the
23 initiator and I/O devices having the unique address.

1 36. The system of claim 35, wherein the loop is attached to the switch port
2 through which the device connects to the switch.

1 37. The system of claim 36, wherein the code further causes the initiator
2 device to perform:
3 receiving, in response to the first query to the switch over the first network,
4 switch addresses the switch assigns to the I/O devices attached to the switch ports,
5 wherein the topology information is generated to include the received switch addresses
6 for the I/O devices.

1 38. The system of claim 35, wherein additional initiator devices are connected
2 to switch ports on the switch, wherein the code further causes the initiator device to
3 perform:
4 submitting an additional query on the second network to at least one other
5 initiator device connected to one switch port, wherein the at least one other initiator
6 device generates topology information to determine topology information for I/O devices
7 to which the at least one other initiator device is capable of communicating; and

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8 updating the topology information with topology information received in response
9 to each additional query on the second network from the at least one other initiator
10 device.

1 39. The system of claim 38, wherein the code further causes the initiator
2 device to perform:
3 receiving, in response to the first query to the switch over the first network, a
4 switch address assigned to each I/O device port, wherein the generated topology
5 information provides the switch address for each initiator device port and I/O device port.

1 40. The system of claim 32, wherein the topology information is updated for
2 I/O device ports attached to one switch port in the same zone as the initiator device.

1 41. The system of claim 40, wherein at least one other initiator device
2 generates topology information to determine topology information for I/O devices to
3 which the at least one other initiator device is capable of communicating, wherein the
4 code further causes the initiator to perform:
5 querying the at least one other initiator device to obtain the topology information
6 generated by the at least one other initiator device; and
7 updating the topology information with topology information received in response
8 to querying the at least one other initiator device, wherein the topology information
9 received from the at least one other initiator device is capable of including I/O devices in
10 other switch zones.

1 42. An article of manufacture including code for discovering a topology of a
2 switch from an initiator device, wherein the switch includes a plurality of switch ports,
3 wherein a plurality of Input/Output (I/O) devices are connected to the switch ports,
4 wherein each I/O device and the initiator device connect to the switch through one of the
5 switch ports, wherein the initiator and I/O devices communicate on a first network

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6 configured by the switch, wherein the initiator device communicates with the switch over
7 a second network, and wherein the code causes the initiator device to perform:
8 submitting a first query over the first network to the switch requesting a unique
9 address of a plurality of I/O devices that are accessible to the initiator device over the
10 first network;
11 receiving, in response to the first query to the switch on the first network, the
12 unique address of each I/O device from the switch;
13 submitting a second query over the second network to the switch for information
14 on switch ports on the switch;
15 receiving, in response to the second query to the switch over the second network,
16 the information on the switch ports; and
17 generating information on a topology of the switch ports and the initiator and I/O
18 devices having the unique address.

1 43. The article of manufacture of claim 42, wherein at least one I/O device is
2 attached to a loop, wherein the loop is attached to the switch port through which the
3 device connects to the switch.

1 44. The article of manufacture of claim 43, wherein each loop comprises a
2 Fibre Channel Arbitrated Loop, and wherein each unique address comprises an eight bit
3 Arbitrated Loop Physical Address.

1 45. The article of manufacture of claim 43, wherein the code further causes
2 the initiator device to perform:
3 receiving, in response to the first query to the switch over the first network,
4 switch addresses the switch assigns to the I/O devices attached to the switch ports,
5 wherein the topology information is generated to include the received switch addresses
6 for the I/O devices.

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51. The article of manufacture of claim 50, wherein the topology information received in response to the additional query to the at least one other initiator device is capable of including topology information on I/O devices in different zones implemented by the switch.

1 52. The article of manufacture of claim 42, wherein the I/O devices include
2 storage systems and initiator devices.

1 53. The article of manufacture of claim 42, wherein there is one unique
2 address for each I/O device and initiator included in the topology information, wherein
3 each I/O device and initiator is capable of including multiple ports.

1 54. The article of manufacture of claim 42, wherein there is one unique
2 address for each port in the I/O devices and initiators included in the topology
3 information.

1 55. The article of manufacture of claim 54, wherein the code further causes
2 the initiator device to perform:
3 receiving, in response to the first query to the switch over the first network, a
4 switch address assigned to each I/O device port, wherein the generated topology
5 information provides the switch address for each initiator device port and I/O device port.

1 56. The article of manufacture of claim 55, wherein the code further causes
2 the initiator device to perform:
3 after obtaining information on all the switch ports on the switch, submitting at
4 least one additional query to the switch for the switch addresses of all I/O device ports
5 connecting to each switch port;
6 receiving, in response to the at least one additional query, the switch address for
7 each I/O device port connecting to each switch port;
8 determining, from the topology information, each I/O device port whose switch
9 address matches one switch address included in the received response to the at least one
10 additional query; and

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11 updating the topology information to include the switch port with the I/O device
12 port whose switch address matches one switch address identified in the received response
13 to the third query as connecting to the switch port.

1 57. The article of manufacture of claim 56, wherein the topology information
2 is updated for I/O device ports attached to one switch port in the same zone as the
3 initiator device.

1 58. The article of manufacture of claim 57, wherein at least one other initiator
2 device generates topology information to determine topology information for I/O devices
3 to which the at least one other initiator device is capable of communicating, wherein the
4 code further causes the initiator device to perform::
5 querying the at least one other initiator device to obtain the topology information
6 generated by the at least one other initiator device; and
7 updating the topology information with topology information received in response
8 to querying the at least one other initiator device, wherein the topology information
9 received from the at least one other initiator device is capable of including I/O devices in
10 other switch zones.

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